Amendments to the claims:

This listing of claims will replace all prior versions and listings of claims in the application:

1.(Cancelled) Apparatus for computational adaptive imaging including:

an image information acquirer providing information relating to the refractive characteristics in a three-dimensional imaged volume;

a ray tracer, utilizing the information relating to the refractive characteristics to trace a multiplicity of rays from a multiplicity of locations in the three-dimensional imaged volume through the three-dimensional imaged volume, thereby providing a location dependent point spread function; and

a deconvolver, utilizing the location dependent point spread function, to provide an output image corrected for distortions due to variations in the refractive characteristics in the three-dimensional imaged volume.

2.(Cancelled) Apparatus according to claim 1 wherein the acquirer is adapted to obtain refractive index information from DIC, for example from phase microscopy or from fluorescence.

3.(Cancelled) Apparatus according to claim 1 wherein the acquirer is adapted to utilize previously determined refractive characteristics.

4.(Cancelled) Apparatus for computational adaptive imaging according to claim 1 and wherein the image information acquirer acquires at least two three-dimensional images of a three-dimensional imaged volume, at least one of the two three-dimensional images containing the information relating to the refractive characteristics in a three-dimensional imaged volume.

5.(Cancelled) Apparatus according to claim 4 and wherein the image acquirer acquires at least three three-dimensional images of the three-dimensional imaged volume.

6.(Cancelled) Apparatus according to claim 4 and wherein the image acquirer acquires a plurality of three-dimensional images of the three-dimensional imaged volume, each the image having a discrete wavelength band.

7.(Cancelled) Apparatus according to claim 4 and wherein the image acquirer acquires a multiplicity of three-dimensional images of the three-dimensional imaged volume, each the image having a wavelength band which is part of a continuum represented by the wavelength bands of the multiplicity of three-dimensional images.

8.(Cancelled) Apparatus according to claim 4 wherein the image acquirer acquires a single three-dimensional image of the three-dimensional image volume.

9.(Cancelled) Apparatus according to claim 4 and wherein the ray tracer and the deconvolver utilize the information relating to the refractive characteristics in a three-dimensional imaged volume obtained from one of the three-dimensional images to correct at least another one of the three-dimensional images.

10.(Cancelled) Apparatus according to claim 9 wherein the ray tracer includes effects on the image of absorptions, reflections and scattering in the sample.

11.(Cancelled) Apparatus according to claim 1, and wherein the three-dimensional images are electromagnetic energy images.

12.(Cancelled) Apparatus according to claim 11 and wherein the three-dimensional images are infrared images.

13.(Cancelled) Apparatus according to claim 1, and wherein the three-dimensional images are non-electromagnetic images.

14.(Cancelled) Apparatus according to claim 1, and wherein the image acquirer receives digital image data from a digital image source and derives therefrom the information relating to the refractive characteristics in a three-dimensional imaged volume.

15.(Cancelled) Apparatus according to claim 1, and wherein the image acquirer, the ray tracer and the deconvolver operate repeatedly over time to provide a multiplicity of output images, each corrected for distortions due to variations in the refractive characteristics in the three-dimensional imaged volume.

16.(Cancelled) Apparatus according to claim 1, and wherein the output image is an acoustic image and the refractive characteristics are characteristics of a material which the passage of acoustic energy therethrough.

17.(Cancelled) Apparatus according to claim 1, and wherein the output image is an electromagnetic image and the refractive characteristics are characteristics of a material which the passage of electromagnetic energy therethrough.

18.(Cancelled) A method for computational adaptive imaging including the steps of:

providing information relating to the refractive characteristics in a three-dimensional imaged volume;

ray tracing, utilizing the information relating to the refractive characteristics, a multiplicity of rays from a multiplicity of locations in the three-dimensional imaged volume through the three-dimensional imaged volume, thereby providing a location dependent point spread function; and

deconvoluting, utilizing the location dependent point spread function, thereby providing an output image corrected for distortions due to variations in the refractive characteristics in the three-dimensional imaged volume.

19.(Cancelled) A method according to claim 18, for adding in the imaging path a three-dimensional medium (anti-sample) with refractive properties that correct for the distortions of the three-dimensional sample.

20.(Cancelled) A method for computational adaptive imaging according to claim 18 and wherein the step of providing information includes acquiring at least two three-dimensional images of a three-dimensional imaged volume, at least one of the two three-dimensional images containing the information relating to the refractive characteristics in a three-dimensional imaged volume.

21.(Cancelled) A method according to claim 20 and wherein the step of providing information includes acquiring at least three three-dimensional images of a three-dimensional imaged volume.

22.(Cancelled) A method according to claim 20 and wherein the step of providing information includes acquiring a plurality of three-dimensional images of the three-dimensional imaged volume, each the image having a discrete wavelength band.

23.(Cancelled) A method according to claim 20 and wherein the step of providing information includes acquiring a multiplicity of three-dimensional images of the three-dimensional imaged volume, each the image having a

wavelength band which is part of a continuum represented by the wavelength bands of the multiplicity of three-dimensional images.

24.(Cancelled) A method according to claim 18, and wherein the three-dimensional images are electromagnetic energy images.

25.(Cancelled) A method according to claim 24 and wherein the three-dimensional images are infrared images.

26.(Cancelled) A method according to claim 18, and wherein the three-dimensional images are non-electromagnetic images.

27.(Cancelled) A method according to claim 18, and wherein the step of providing includes receiving digital image data from a digital image source and deriving therefrom the information relating to the refractive characteristics along a multiplicity of light paths in a three-dimensional imaged volume.

28.(Cancelled) A method according to claim 18, and wherein the steps of providing information, ray tracing and deconvoluting operate repeatedly over time to provide a multiplicity of output images, each corrected for distortions due to variations in the refractive characteristics in the three-dimensional imaged volume.

29.(Cancelled) A method according to claim 28 wherein the refractive characteristics are estimated.

30.(Cancelled) Apparatus for utilizing differential interference contrast images to provide three-dimensional refractive index information including a line integrator operating on differential interference contrast images displaying a directional derivative of refractive index of an object to invert the directional

derivative thereof, thereby providing a plurality of two-dimensional representations of the refractive index of the object.

31.(Cancelled) Apparatus for utilizing differential interference contrast images to provide three-dimensional refractive index information according to claim 30 and also including a deconvolver performing deconvolution of the plurality of two-dimensional representations of the refractive index of the object, thereby reducing out-of-focus contributions to the two-dimensional representations of the refractive index of the object.

32.(Cancelled) A method for utilizing differential interference contrast images to provide three-dimensional refractive index information including performing line integration on differential interference contrast images displaying a directional derivative of refractive index of an object to invert the directional derivative thereof, thereby providing a plurality of two-dimensional representations of the refractive index of the object.

33.(Cancelled) A method for utilizing differential interference contrast images to provide three-dimensional refractive index information according to claim 32 and also including performing deconvolution of the plurality of two-dimensional representations of the refractive index of the object, thereby reducing out-of-focus contributions to the two-dimensional representations of the refractive index of the object.

34.(Original) Apparatus for ray tracing through a medium having multiple variations in refractive index including:

a computer employing an analytically determined path of a ray through the multiplicity of locations in the medium, for a plurality of rays impinging thereon in different directions, by utilizing known local variation of the refractive index at a multiplicity of locations in the medium.

35.(Currently amended) A method of ray tracing through a medium having multiple variations in refractive index including:

determining local variation of the refractive index at a multiplicity of locations in the medium; and

analytically determining the path of a ray through the multiplicity of locations in the medium, for a plurality of rays impinging thereon in different directions.

36.(Cancelled) Apparatus for confocal microscopy including:

a ray tracer, employing known variations of the refractive index in a three-dimensional sample for determining the paths of a multiplicity of rays emerging from at least one point in the sample and passing through the sample, thereby determining an aberrated wavefront for each point; and

an adaptive optics controller utilizing the aberrated wavefront to control an adaptive optical element in a confocal microscope, thereby to correct aberrations resulting from the variations in the refractive index.

37.(Cancelled) A method for confocal microscopy including:

determining variations of the refractive index in a three-dimensional sample;

determining the paths of a multiplicity of rays emerging from at least one point in the sample and passing through the sample, thereby determining an aberrated wavefront for each the point; and

utilizing the aberrated wavefront to control an adaptive optical element in a confocal microscope, thereby to correct aberrations resulting from the variations in the refractive index.

38.(New) Apparatus according to claim 34, and wherein said ray tracer determines an aberrated wavefront for said plurality of rays; and also comprising an adaptive optics controller utilizing said aberrated wavefront to control an

adaptive optical element in a confocal microscope, thereby to correct aberrations resulting from the variations in the refractive index.

39. (New) A method according to claim 35, and also comprising the steps of:

determining an aberrated wavefront for said multiplicity of rays; and

utilizing said aberrated wavefront to control an adaptive optical element in a confocal microscope, thereby to correct said aberrations resulting from said local variation of the refractive index.

40.(New) A method for confocal microscopy comprising the steps of:

providing a confocal microscope having an imaging path between a three-dimensional sample and its output image plane;

determining variations of the refractive index in said three-dimensional sample; and

disposing in said imaging path a three-dimensional medium having properties that correct aberrations resulting from said variations of the refractive index in the three-dimensional sample.

41. (New) Apparatus for confocal microscopy comprising:

an image information acquirer providing information relating to variations in the refractive index in a three-dimensional imaged volume, said apparatus having an imaging path between said three-dimensional imaged volume and said image information acquirer; and

a three-dimensional medium disposed in said imaging path, said three-dimensional medium having properties that correct aberrations resulting from variations of said refractive index in said three-dimensional imaged volume.